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ABSTRACT

A study examined whether the use of word processors would enhance the amount and quality of students' revisions. Subjects, 28 high school sophomores and juniors enrolled in a special class for interested writers, met twice a week for 60 minutes in either a computer laboratory (experimental group) or in a regular classroom (control group). Findings showed that students learned basic word processing skills quickly and with only limited practice. Results indicated that the use of word processing in composition had motivational value, facilitated group discussions about writing, and helped foster peer editing. However, findings also showed that neither the length of the two groups' compositions nor the amount or quality of their revisions differed significantly. Analyses revealed that the experimental group had misspelled significantly fewer words than the control group--probably because it had access to a "spell checker." Questionnaires given to both groups to measure their attitudes about writing indicated that the experimental group felt significantly more positive than the control group about the instruction they had received, about their ability to write, and about editing groups. Overall, results showed that word processing can enhance the teaching of composition but cannot substitute for quality instruction in the entire writing process. A 46-item reference list is appended. (JD)

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USING WORD PROCESSING TO ENHANCE REVISION STRATEGIES DURING STUDENT COMPOSING

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BACKGROUND AND SIGNIFICANCE

Interviews with professional writers (Crowley, 1958) and studies of writing strategies (Beach, 1976; Faigley and Witte, 1981; Monahan, 1984; Sommers, 1978; Stallard, 1974) have supported the hypothesis that the ability to revise successfully is a characteristic of good writers. Yet, revision is perhaps the "least researched, least examined, least understood, and-usually-least taught" (Murray, 1978, p. 85) aspect of the writing process. Studies of student writers have shown that they do very little voluntary revising (Emig, 1971; Mischel, 1974; Wall and Petrosky, 1980). When students do revise, especially if they are not very skilled in writing, they tend to revise superficially, concentrating their revision efforts at surface and word levels (Bridwell, 1980; Monahan, 1982; Perl, 1979). The title of an article about revision by Odell and Cohick (1975), "You mean, write it over in ink?" reflects the attitudes many students seem to have toward revising.

Recently, a number of writers and researchers have praised the editing and text moving capabilities of word processing programs and have proposed that these programs can be useful in helping students revise more readily and skillfully (Bean, 1983; Coburn, Kelman, 1982; Roberts, Synder, Watt, and Neiner, 1982; Daiute, 1982, 1983; Hennings, 1981, 1983; Monahan, 1982; Moran, 1983; Piper, 1983; H. Schwartz, 1984; M. Schwartz, 1982; Whithey, 1983). These authors have cited the computer's value in helping students revise by reducing the frustra-

tions of recopying, by facilitating the reading of text during the various stages of the writing process, by producing neat, publishable copies from the computer printer, and by making possible the reproduction of drafts of compositions for easy sharing with teachers and peers as the writing process unfolds. Womble (1984) and Kurth and Stromberg (1985) observed that when using word processing to write, students stayed with a piece of writing--adding, deleting, moving text--longer than they did with paper and pencil and seemed to develop a better sense of audience. When word processing programs were used with young students for language experience stories, the students made more revisions in their stories using the computer than when the experience stories were done on paper (Barber, 1982; Bradley, 1982).

Some authors have proposed that using a word processor goes beyond simply making revising easier and actually gives the writer a whole new way of composing. The fluency that comes with the liberation from fear of errors may help writing to become the discovery process it should be (McKenzie, 1984; Olds, 1981). Suhol (1985) claims that in addition to providing a means by which a student writer can maintain authority over the text while performing guided revision, the technology of word processing also makes possible a different principle of revision which he calls the principle of addition. He explains:

> The principle of addition states simply: add first, delete last. If you feel uneasy about a word, phrases, sentene, fact, argument, or whatever, move the cursor to the right of it and produce an alternative. And another, and another. Fill the screen with alternatives

> if necessary. Never delete anything until you have produced alternatives. Never delete until you have judged alternatives. The principle of addition allows the text to grow and encourages the writer to exert authority and control over the available choices.

Catano (1985) states that the latest methods of teaching revision, and the theories of writing upon which they are based, have already discredited the old two-step model of composing that gave us writing followed by revision. He argues that teachers should urge students to take risks while revisng their compositions and that one way to help students risk creativity while revising is to allow them to work amidst the textual materials stored on a computer.

Some computer programs have gone beyond being "the electronic pencil" and actually prompt the students to edit various features in their papers. Computer programs like Writer's Workbench (Macdonald, Frase, Gringrich, and Keenan, 1982) search student texts for certain errors in usage or various stylistic features. Preliminary studies have suggested that students do not resent the error-hunting aspect of such processing of their texts (Sommers, 1982) and that they carry over what they have learned about style and apply it to texts that are not run through a program (Kiefer and Smith, 1983). Spelling checkers can help students compose more freely in the first stages of their composing since they can concentrate on issues besides spelling as they compose. Spelling checkers will not find errors with homonyms, but the search and replace function of the word processor helps a writer who can identify his characteristic misspellings. The student can

concentrate on one error at a time (H. Schwartz, 1984). Programs for young writers like Quill, Wandah, The Writer's Helper, The Writer's Workshop, and The Writer's Assistant provide guidance in prewriting, have a word processor, and present editing and rewriting aids (Marcus, 1984). In addition, teachers of writing have developed their own strategies and programs to help students use the power of the computer to write and revise more successfully (Newman, 1984; H. Schwartz, 1982; 1984).

Observations of students and attitude questionnaires have confirmed the motivational value of using word processing (Bean, 1983; Bradley, 1982; Daiute, 1982, 1983; Stromberg and Kurth, 1984; Woodruff, Bereiter, and Scardamalia, 1981-82). L. Meyers and T. Rosegrant used their Talking Screen Textwriting Program to help severely language disabled students gain access to written and oral language through the use of a computer (Trachtman, 1984). Learning disabled students who had experienced great failure in learning to write responded positively to the use of word processing (Kramer, 1984). Papert (1980) cited children in his MIT computer center who went from "total rejection of writing to an intense involvement (accompanied by rapid improvement in quality) within a few weeks of beginning to write with the computer" (p. 30). Suhol (1985) notes that a room full of word processing computers not only brings writers together but it also encourages a sense of enterprise and accomplishment among the users, and that this community of writes provides a nearly ideal setting for collaborative learning.

Although there is great interest in using word processing programs to help students develop interest and skill in revising, research in the area is still limited. Collier (1983) found that the use of a text editor increased the number and complexity of revision operations and encouraged greater manipulation of material at the word and phrase/clause level, but little whole text revision was accomplished by the students he observed. The quality of the student essays was not affected by the revision efforts of the students. However, Collier noted that the word processing system his students used was so difficult to master that much of their energy and time was devoted to learning to manipulate the word processing system itself. Sixth graders, in a study by Woodruff, Bereiter, and Scardamalia (1981-1982), perceived that the computer made writing easier, better, and more enjoyable. However, the use of word processing did not improve the quality of the written compositions. In a study involving six student writers in honors English and advanced composition courses, Harris (1985) found that her subjects liked to use word processing and planned when possible to use it for future writing tasks. They found that writing with the aid of the word processing was easier, faster, and neater. However, her research suggested that the use of word processing seemed to discourage revision, especially at the macrostructure level.

Thus the purpose of this study was to determine if the use of computer word processing would improve both the amount and quality of revision done by high school student writers.

Subjects

The subjects for this study were 28 sophomore and junior high school students enrolled in a special class for interested writers at a university writing center. All students were taking this class as an elective activity which was part of the extra curricular program in their high school. Because they elected to take a writing course, it is very probable that these Subjects were more interested in writing and were better writers than average sophomore and junior high school students. However, the fact that they were allowed to leave the high school campus and come to the University might also have motivated some of these students to choose this particular extra curricular activity.

Treatment

The Subjects were randomly assigned to one of two groups. Fourteen students were assigned to the experimental group and were given composition instruction using computer word processing. Fourteen students were randomly assigned to the control group and were given composition instruction without the use of word processing. The word processing group met on Monday and Wednesday afternoons for 60 minutes in a computer laboratory, while the non word processing group met on Tuesday and Thursday afternoons for 60 minutes in a regular classroom. Both groups met for twelve weeks, so each student received 24 hours of instruction. Neither group was told about the activities in the other group.

The same instructor taught both groups. The instructor was a

secondary English composition teacher from another high school. She was a graduate student with a major research interest in the composing processes. She had also participated in many area writing and composition projects. She was also familiar with the word processing program used in the study.

The major focus of the instruction in both classes was expository writing. Students in both classes were taught prewriting skills, draft writing, revising and editing skills and were encouraged to use them. The teaching strategies for revision emphasized global revisions rather than surface or word level revisions. Because this class was an extra curricular activity, no high school course credit or grades were given. However, each student was assigned seven compositions and these compositions were evaluated and graded. Only seven assignments were given so that students would have sufficient time to revise each composition. Each student could turn in as many drafts of each composition as he/she desired. In each class students were assigned to revising and editing groups and they were encouraged to consult with these groups often. However, they were required to consult with their revising and editing group at least once before they could turn in the final draft of each composition.

All of the instructional objectives and instructional methods were the same for the two groups. However, in the word processing group, each student had access to an Apple IIE or IBM computer and the Word Perfect word processing software. A spelling checking program was also available for the students' use in the word processing group. The Word

Perfect software was used because a version was available for both types of computers in the laboratory and because it is easy to learn.

The students in the word processing group were given a short introduction to the use of the software by the course instructor. This instruction was limited to these word processing features: enter; retrieve document, save document; delete letter, word, line, block, and end of page; move sentence, paragraph, block; search; print; and exit. Students were also given a one page summary of directions and command codes for these functions. They were not encouraged to learn other features of the word processing program because the focus of the instruction was to be writing skill, not word processing skill.

All students were encouraged to do their writing during the 60 minute class period. However, they were allowed to take compositions home to work on them if they desired. For the first class session, the word processing students were given a keyboarding practice program in order to develop some facility with keyboarding. Because of this, the word processing group received less actual composition instruction than their counterparts in the other group. Two observers, both writing master's theses in reading education, were present during many of the instructional sessions to observe some of the revision groups as they worked. All of the drafts and the final paper from four of the nine assignments were collected for analysis.

RESULTS AND DISCUSSION

Because students were assigned a certain number of specific compositions that needed to be completed, there was little variation in

the number of compositions written by the two classes. All of the students in both groups completed all of the assigned writing tasks. One student in each group wrote one extra unassigned composition.

The number of words in the final drafts for each of four composition assignments was determined. When the length of the compositions in both groups was analyzed, no significant differences were found between the two groups. The mean number of words per composition for the word processing class was 189.2 with a standard deviation of 75.2 The mean number of words per composition in the non word processing group was 182.2 with a standard deviation of 73.8. The mean composition length and standard deviation for the four assignments analyzed are shown in Table 1 below.

TABLE 1

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Means and Standard Deviations for Composition Length

	Word Processing Group		Non-Word Processing Group	
	Mean	S.D.	Mean	S.D.
Assg. 3	162.5	38.42	160.86	59.1
Assg. 5	258.1	64.6	242.0	65.2
Assg. 7	91.5	18.6	94.9	20.39
Assg. 9	238.6	20.39	232.0	25.40
Total	189.2	75.2	182.2	73.8

The results of the analysis of composition length show that the purpose and type of composition assignment had more influence on the length of the composition than did the word processing. While there was much variation in composition length within each group, there was no significant difference in composition length between the two groups. The students who wrote longer compositions consistently wrote longer compositions on every assignment in both groups. Those students who generally wrote shorter compositions wrote short compositions for every assignment in both groups.

These results show that the students in the word processing group did not write longer compositions than did the students in the non word processing group. However, even though students in the word processing group had to take time for the keyboarding training and also had to learn to use the software, they managed to write as many compositions of equal or greater length during the class as did the students in the non word processing group. The necessity of learning a word processing program did not appear to inhibit the amount of writing done by the students in the word processing group. Learning to use the word processor was not difficult for the students in the word processing group. An informal check at the end of the experiment showed that students in the word processing group could perform all of the selected word processing features adequately. This finding differs from previous studies where learning the software program proved difficult for students. The recent improvements in word processing software may account for this change. However, the use of word processors did not result in longer compositions.

A second objective of the study was to determine if students using word processing would do more revision than students who were not using word processing. To answer this question, the researchers counted the number of revisions which had been made between the first rough draft which had been submitted to the teacher for comments and the final paper submitted to the teacher for a grade. Every change was counted as a revision even if it was a spelling change. After the number of revisions from first draft to final draft had been determined for each assignment, those revisions which were at the phrase or sentence level were identified and counted. Finally those revisions which could be considered global in nature, i.e. affecting at lease two or more sentences, were identified and counted. The results of this analysis are shown in Table 2.

TABLE 2

Number and Types of Revisions made in Composition Assignments

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Assignment Three 14 papers

Group	# of revisions	# of sentence or phrase revisions	# of global revisions
With Word Processing	136	48	11
Without Word Processing	142	54	8

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Table 2, Cond.

Assignment Five 14 papers

Group	# of revisions	# of sentence or phrase revisions	# of global revisions
With Word Processing	96	31	12
Without Word Processing	82	54	9

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Assignment Seven 14 papers

Group	# of revisions	# of sentence or phrase revisions	# of global revisions
With Word Processing	45	12	6
Without Word Processing	51	11	6

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Assignment Nine 14 papers

Group	# of revisions	# of sentence or phrase revisions	# of global revisions
With Word Processing	121	36	12
Without Word Processing	132	39	11

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Because students were taught revision techniques in the classes and were strongly encouraged to revise their compositions, students did substantial revision in both groups. However, there were no significant differences between the two groups when the papers were analyzed for number and type of revisions.

An analysis of the quality of revisions showed that, in most cases, the changes which students made were improvements in the quality of the compositions. There were a number of global revisions in which sentences or paragraphs were rearranged or placed in other positions in the papers. It may be that the ease with which sentences and paragraphs can be moved on a word processor did stimulate students to make global revisions. However, since just as many students in the non word processing group made global revisions, the instruction in global revision given in both classes probably did more to stimulate global revisions than did the use of the word processor. Many of the word level changes involved using a more precise term for a more general term. Many of the surface and word level changes were spelling corrections. There were significantly fewer misspelled words in the word processing group than in the non word processing group. This was undoubtedly due to the fact that the students in the word processing group had access to a spelling checker.

In three instances in the non word processing group, a rough draft was redone with no changes except that it was rewritten in ink. This type of revision occurred in the word processing group also where four times a document was reprinted so that it would be double spaced.

At the end of the class, students in both groups were given an inventory which measured attitudes about writing. This instrument was a 15 item Likert scale questionnaire which attempted to measure how students felt about their writing abilities. The same instrument was used for both the word processing group and for the non word processing group. No questions on the attitude inventory dealt with the use of word processing. Two of the items were concerned with peers' abilities to help each other improve their writing. The final question on the inventory asked for a numerical rating of the quality of the writing course that the students had just completed.

When the results of the attitude inventory were analyzed, significant differences were found between the two groups. The mean for the attitude score for the word processing group was 52.6 (s.d. =12) while the mean for the general attitude score for the non word processing group was 42.5 (s.d. =8). In general, the word processing group felt more positive about the instruction they had received, more positive about their ability to write, and more positive about editing groups than the non word processing group.

Anecdotal notes from the observers in the two classes seemed to indicate that the presence of the computer screens appeared to facilitate more discussion and group editing and revising because the screen provided easier access to the print. Even though both classes were required to use editing groups, the editing groups met more formally but for shorter periods of time in the non word processing groups and more informally but for longer periods of time in the computer room. The observers noted that whenever the word processing group came to

class, they placed their disks in the computer and immediately started to write or show others what they had written at the last session. The appearance of the work on the screen seemed to help focus student attention on the writing task at hand. This did not happen in the non word processing class. The students talked with each other, but because they did not immediately focus on their work appearing on the screen, they discussed other things. The effectiveness of the computer in helping students focus on the task at hand has been noted by other researchers such as Marcus (1984) and Newman (1984).

As noted by Woodruff, Bereiter, and Scardamalia (1982); Collier (1983); and Bradley (1982), the importance of word processing as a motivational tool was apparent. This was as true for the girls in the word processing class as it was for the boys. One of the computers was connected to a large screen monitor. Students in the word procesing group were especially anxious to use this computer and have their work shown very conspicuously. The ability to produce many quality copies of their work for sharing with others also appeared to be motivational for students in the word processing group. Observers noted that students were much more willing to read the stories of others when they were printed rather than when they were handwritten. The printer used in the study was a high speed letter quality printer. Even though the compositions in the non word processing class were xeroxed for easy access for revising groups, the quality of some of the student hand-writing made editing and revising more difficult.

CONCLUSIONS

Word processing programs can be used to enhance the teaching of written composition. The results of this study show that students can learn basic word processing skills quickly with only limited practice, and that the use of word processing does have motivational value. However, this study did not support the idea that working with word processing will automatically increase the quantity and quality of student compositions. The use of word processing can only enhance the teaching of written composition. The most important ingredient in any composition program is a teacher who is knowledgeable about the composing processes. Instruction in pre writing activities, organizational methods, draft writing, revision skills, and provision for publishing student work are necessary parts of any composition instruction with or without word processing. The use of word processing cannot substitute for quality instruction in the entire writing process. However, the use of computer word processing in writing programs seems to have motivational value, seems to facilitate group discussions about writing, and may help foster peer editing.

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